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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,372	03/30/2004	Ming Li	MATG-395US	4694
23122	7590	08/01/2006	EXAMINER	
RATNERPRESTIA			BOOTH, RICHARD A	
P O BOX 980			ART UNIT	
VALLEY FORGE, PA 19482-0980			PAPER NUMBER	
			2812	

DATE MAILED: 08/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/813,372

Applicant(s)

LI ET AL.

Examiner

Richard A. Booth

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-84 is/are pending in the application.
- 4a) Of the above claim(s) 20,25-83,85 and 86 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19,21-24 and 84 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>0905, 0304</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election without traverse of the specie directed to a method of manufacturing microstructure devices in the reply filed on 5/8/06 is acknowledged.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 6, 8-9, 11-12, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Kley et al., WO 01/03157.

Shows the invention as claimed including a method for manufacturing a microstructure device, which includes at least one fine feature on an existing feature, using a near field scanning optical microscope (NSOM) laser micromachining system (see page 3-lines 30-31) including a NSOM and a micro-machining laser, the method comprising the steps of: a) providing a microstructure device perform including the existing feature on a top surface; b) profiling a portion of the top surface of the microstructure device perform with the NSOM to produce a topographical image of the portion of the top surface, the portion of the top surface selected such that the topographical image includes a representation of the existing feature (see, for example, page 22-line 33 to page 23-line 4); c) defining an image coordinate system, in terms of

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settings of the NSOM, for the profiled portion of the top surface of the microstructure device perform based on the topographical image; d) determining coordinates of a reference point and an orientation of the existing feature of the top surface of the microstructure device perform in the image coordinate system using the topographical image (see, for example, page 17-lines 17-27); e) aligning a probe tip of an NSOM probe of the NSOM over a portion of the existing feature of the microstructure device perform using the coordinates of the reference point and the orientation of the existing feature determined in step (d); and f) machining the top surface of the microstructure device perform with the micro-machining laser (see generally entire document for description of process).

Concerning claim 2, note that step (b) will include the steps of: b1) selecting the portion of the top surface of the microstructure device preform to be profiled; b2) aligning the probe tip of the NSOM over a point in the selected portion of the top surface of the microstructure device perform; b3) determining a distance between the probe tip of the NSOM and the top surface of the microstructure device perform; and b4) controlling the distance between the probe tip and the top surface such that the distance is substantially equal to a profiling distance by moving one of the NSOM probe or the microstructure device perform in a vertical direction; b5) scanning the probe tip over the selected portion of the top surface while repeating steps b3 and b4 to maintain the distance between the probe tip and the top surface substantially equal to the profiling distance; and b6) determining topographical information of the surface based on the

vertical movement of the one of the NSOM probe or the microstructure device perform moved in step b4 (see, for instance, page 16-lines 10-22).

Regarding claim 3, note that step (b1) can also include the steps of: b1a) optically imaging the top surface of the microstructure device perform to produce an optical image; b1b) identifying an area of the top surface that includes the existing feature from the optical image; b1c) selecting the area identified in step (b1b) as the portion of the top surface to be profiled.

With respect to claim 6, note that the step of controlling the distance between the probe tip and the top surface of the microstructure device perform includes using a Z motion stage to control a vertical position of one of the NSOM probe or the microstructure device preform based on the distance between the probe tip and the top surface determined in step b3.

Concerning claim 8, note that step b5 includes the steps of: b5a) moving the probe tip back and forth across the selected portion in a first horizontal direction to perform a plurality of passes; and b5b) moving the probe tip a predetermined distance in a second horizontal direction between each consecutive pair of passes, the second horizontal direction being different from the first horizontal direction, thereby scanning the selected portion of the top surface (note that the Kley et al. reference discloses using multiple scans).

With respect to claim 9, the image coordinate system includes X, Y, and Z coordinates for the profiled portion of the top surface of the microstructure device

preform, the X, Y, and Z coordinates being respectively scaled to corresponding X, Y, and Z settings of the NSOM determined in step (b).

Regarding claim 11, step (e) includes the steps of: e1) aligning the probe tip horizontally over a portion of the existing feature of the microstructure device preform; and controlling the distance between the probe tip and the top surface of the microstructure device preform to be substantially a machining distance based on the topographical image of the portion of the top surface of the microstructure device preform and the image coordinate system.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al., WO 01/03157.

Kley et al. is applied as above but does not expressly disclose the specific profiling or machining distance. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum profiling or machining distance based upon a variety of factors including the specific strength of the laser and desired depth of machining, for example, and such limitations would not lend patentability to the instant application absent a showing of unexpected results.

Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al., WO 01/03157 in view of Liu et al., U.S. Patent 6,720,519.

Kley et al. is applied as above but does not expressly disclose the process of step (f) as disclosed by claims 14-17 including generating pulses of laser light using a laser oscillator, attenuator, shutter, and polarizer as claimed. Liu et al. discloses a laser micromachining process that includes generating short pulses from a laser oscillator, using an attenuator 115 to control the laser pulses, using a polarizer (see col. 7-lines 17-23) to adjust the polarization to circular polarization, and using a shutter 110 in order to micromachine desired areas for desired times (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kley et al. so as to use the process shown by Liu et al. because in such a way a device will be effectively micromachined.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al., WO 01/03157 in view of Weber, U.S. Patent 5,597,643.

Kley et al. is applied as above but does not expressly disclose the particular type of laser, for example, an excimer laser. Weber discloses using an excimer laser, for example, for laser micromachining (see col. 7-lines 38-54). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kley et al. so as to perform laser micromachining using the lasers disclosed by Weber because these lasers have been shown to be suitable for carrying out effective laser micromachining processes.

Claims 21-22 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al., WO 01/03157 in view of Kubena et al., US 2005/0269901.

Kley et al. is applied as above but does not expressly disclose wherein the device to be machined is a mems oscillator. Kubena et al. discloses using laser processes in order to tune a mems oscillator (see paragraph 0006 and 0010, for example). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kley et al. so as to machine a mems osciallator using the laser micromachining process because in such a way the mems oscillator can be tuned to the desired values. Furthermore, note that the combination of the Kley et al. and Kubena et al. references teach the process of claims 21-22.



Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al., WO 01/03157 in view of Li et al., U.S. Patent 6,947,649.

Kley et al. is applied as above but does not expressly disclose wherein the device to be machined is a photonic crystal. Li et al. discloses using laser micromachining in order to tune a photonic crystal (see title and abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kley et al. so as to use micromachine a photonic crystal because Li et al. discloses that laser micromachining is an effective method in which to tune a photonic crystal.

#### ***Allowable Subject Matter***

Claims 4-5 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

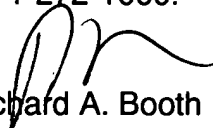
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Richard A. Booth  
Primary Examiner  
Art Unit 2812

July 23, 2006